Text Mining for Historical Documents
Metadata, Standardisation, Semantic Web

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Metadata

Data and Metadata

Distinction

primary data (=data) vs. secondary data (=metadata)

Types of metadata

- data that contextualises the object (e.g., when and where found; written by whom etc.)
  - created manually by experts (expedition leaders, curators etc.)
  - usually created immediately
  - may or may not be digitised
  - typically fixed / sacrosanct, can only be (monotonically) added to (at least for museums)
    $\Rightarrow$ **metadata provenance**
- data that provides additional information to improve data access (semantic annotation in the widest sense)
  - manually, semi-automatically, or automatically created
  - typically digitised
  - can change over time (i.e., monotonically increase)

$\Rightarrow$ As a rule of thumb, human generated/verified metadata should not be deleted or overwritten.

‘Semantic’ Metadata (1)

Types of metadata annotations

'Semantic' Metadata (1)

Types of metadata annotations

- general linguistic analyses, esp.
  - word sense disambiguation
  - co-reference resolution
  - named entity tagging
  - named entity disambiguation and linking
- enrichment for information retrieval
  - synonyms (possibly hypernyms, hyponyms)
  - annotation with modern language equivalents (for words from older language varieties)
  - annotation with corrected forms (for OCR errors or typos)
  - translations into other languages
  - transcripts of speech or non-OCRed material
  - content annotation (keywords, descriptions)

'Semantic' Metadata (2)

Types of metadata annotations (contd)

- data provenance information, e.g.:
  - was an entry in a database corrected (when? by whom? how?)
  - was additional information entered (when? by whom? how?)
- miscellanea, e.g.:
  - information about links between data sources
  - information extraction information (e.g., explicit structuring of semi-structured data)
  - browsing history (e.g., for website content)

$\Rightarrow$ metadata can come in several layers

Standardisation

Controlled Vocabularies

Motivation

natural language can be fuzzy (**synonymy** and **polysemy**)

$\Rightarrow$ many-to-many mapping between form and meaning

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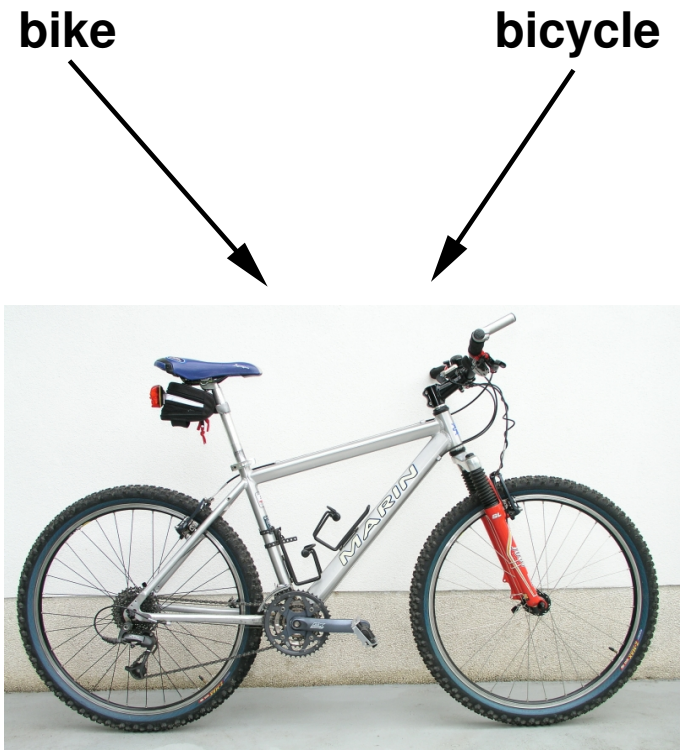

(Source: http://en.wikipedia.org/wiki/File:Marin_bike.jpg)

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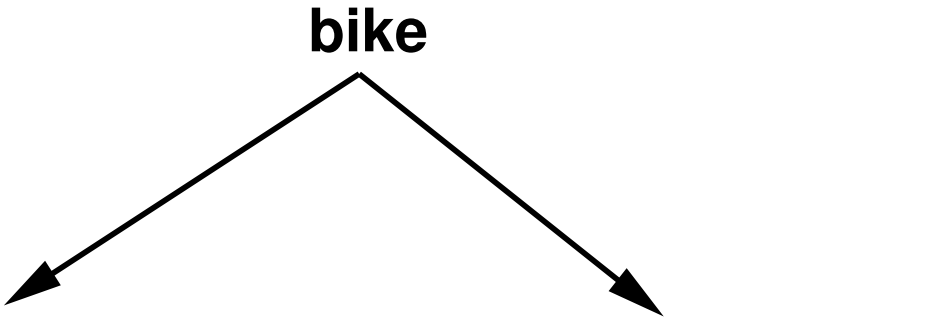


(Source: http://en.wikipedia.org/wiki/File:Marin_bike.jpg)

(Source: http://en.wikipedia.org/wiki/File:Triumph_T_110_650_cc_1954.jpg)

Controlled Vocabularies

Motivation

natural language can be fuzzy (**synonymy** and **polysemy**)
$\Rightarrow$ many-to-many mapping between form and meaning

Controlled Vocabularies (CVs)

- in keyword-based search synonymy and polysemy lower recall and precision, respectively
- controlled vocabularies fix which terms can be used for annotation and searching
  $\Rightarrow$ avoid ambiguity and impreciseness
- CH institutes use existing CVs (e.g., domain thesauri) or develop CV inhouse
- may or may not improve retrieval results, depending on situation (Svenonius, 1986)

Semantic Interoperability

What?

In order to (automatically) share information across collections and/or institutes, the semantic metadata have to be compatible. Controlled vocabularies (=lists of standardised terms) are not sufficient.

Solution

metadata standards in the form of ontologies or domain descriptions, e.g.:

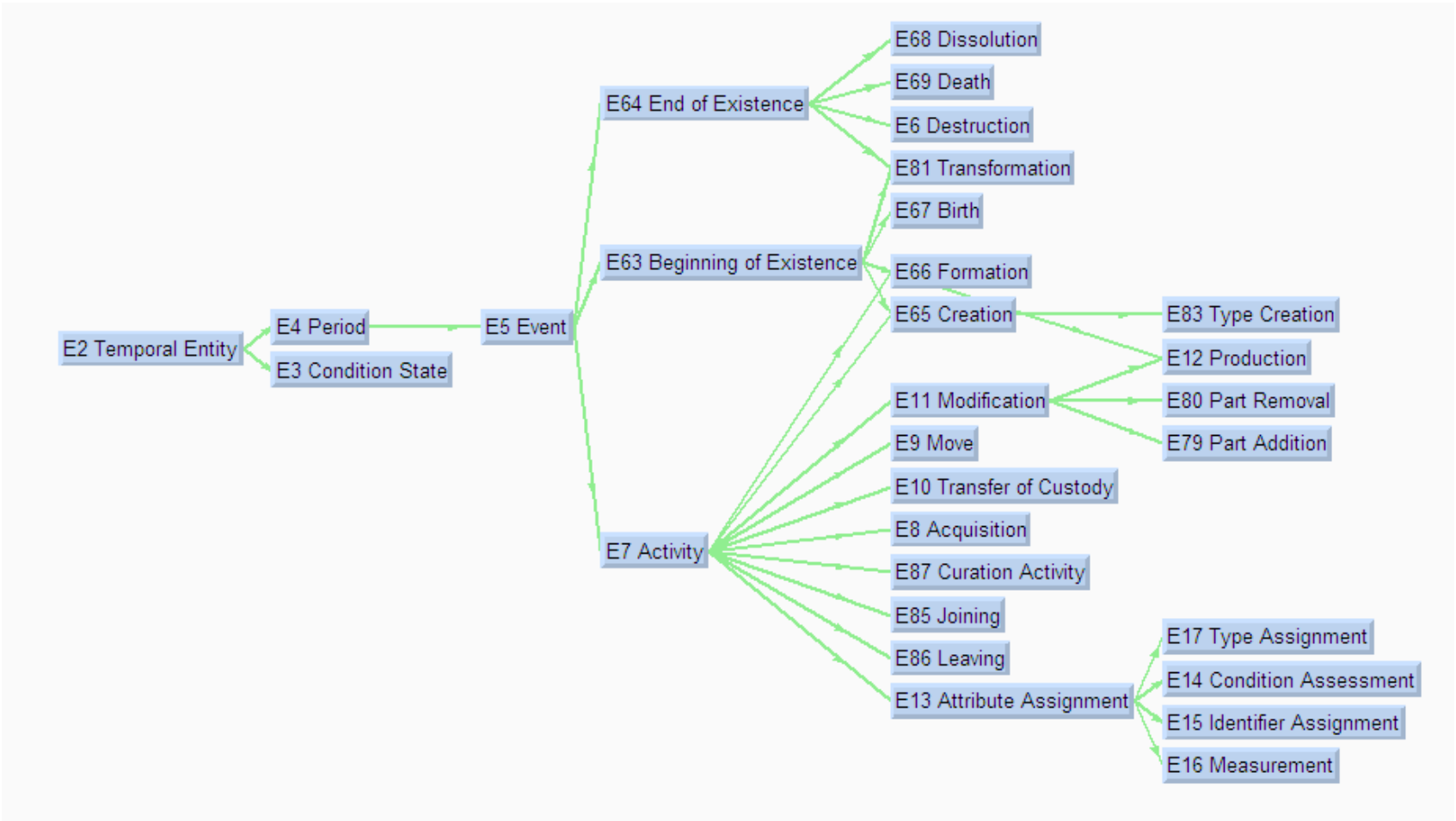
- Dublin Core (general)
- MIDAS heritage standard
- CIDOC Conceptual Reference Model (CIDOC-CRM)

CIDOC-CRM

What?

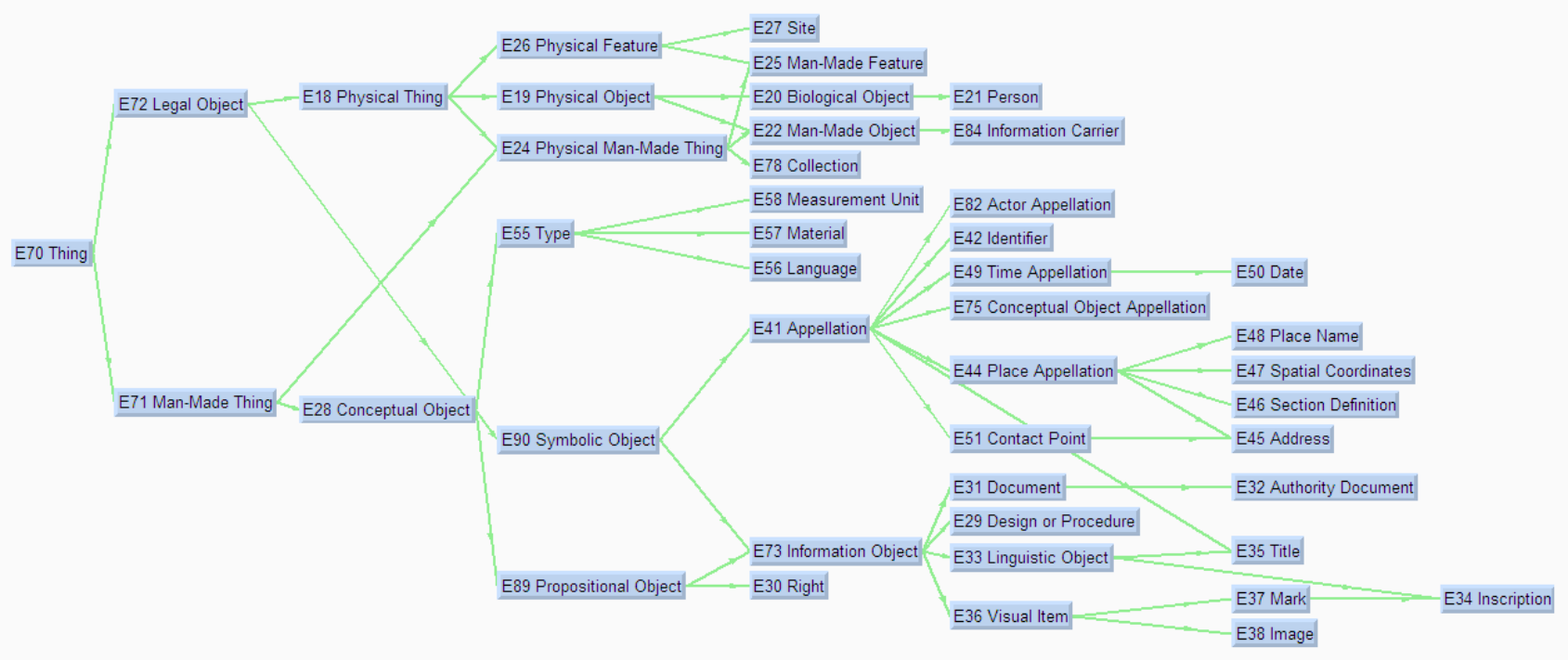
- provides definitions and formal structure for describing concepts and relationships between concepts in cultural heritage
- establishes a formal semantics for the domain description
- can be encoded in XML, RDF(S) etc.

CIDOC-CRM: Temporal Entity Hierarchy



Source: Martin Doerr, Steve Stead, "The CIDOC CRM, a Standard for the Integration of Cultural Information", CRM tutorial at Imperial College, UK, May 22, 2009.

CIDOC-CRM: 'Thing' Hierarchy



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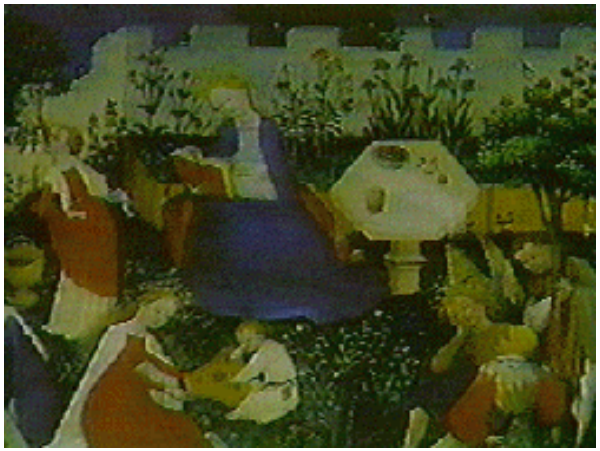
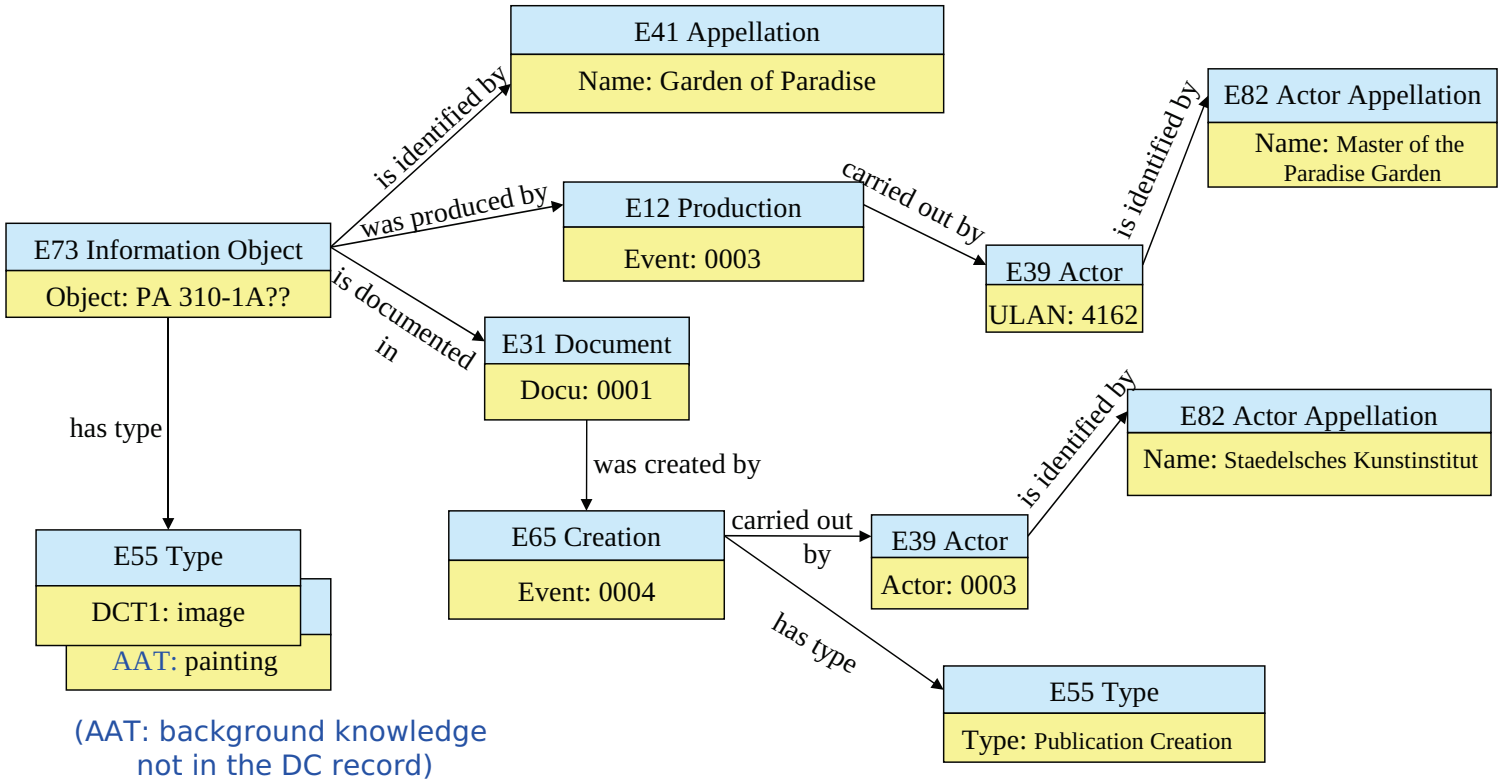
CIDOC-CRM: Example (1)



Type: painting
Title: Garden of Paradise
Creator: Master of the Paradise Garden
Publisher: Staedelsches Kunstinstitut

Source: Martin Doerr, Steve Stead, "The CIDOC CRM, a Standard for the Integration of Cultural Information", CRM tutorial at Imperial College, UK, May 22, 2009.

CIDOC-CRM: Example (2)



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Integrating Different Standards

Problem

Standards are good but having many standards doesn't solve the interoperability problem.

Solution

- can map different namespaces, ontologies etc. manually
- RDF provides support for integrating various namespaces
- **but:** automatic mapping would be better
  $\Rightarrow$ still focus of ongoing research (e.g., automatic ontology mapping)